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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/786,452	02/24/2004	Charles L. Tilton	ISR-172	4914
7590		11/13/2007		
Paul A. Knight				
2218 North Molter Road				
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			EXAMINER	
			DUONG, THO V	
			ART UNIT	PAPER NUMBER
			3744	
			MAIL DATE	DELIVERY MODE
			11/13/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/786,452

Applicant(s)

TILTON ET AL.

Examiner

Tho v. Duong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS; WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-17, 19-31, 35, 37, 38 and 45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-17, 19-31, 35, 37, 38 and 45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Receipt of applicant's amendment filed 8/22/07 is acknowledged. Claims 8-17, 19-31, 35, 37-38, and 45 are pending.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the claimed subject matter of "a plurality of microchannels" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 8-17,19-31,35,37-38 and 45 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claimed subject matter of negative limitation such as “non-incremental” pattern or manner is not supported by the original disclosure. Applicant is silent whether the flow rate or mass flow of the fluid is constant or non-incremental. In fact, applicant discloses page 14-15 that the sprayer is variable and controllable to achieve overall thermal performance control since the chip can produce highly variable heat flux as a function of time.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 10, 17 and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claimed limitation of “said secondary orifice is an incremental drop ejector” renders the scope of the claim indefinite since it contradicts with the limitation of “non-incremental” in claim 9, 16 and 24.

Claims 8-17,19-31,35,37,38 and 45 are further rejected as can be best understood by the examiner.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8,11,15,19,23,26,29 and 31 and 45 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Patel et al. (US 6,612,120). Patel discloses (figures 3, 4 and column 5, lines 25-54) a spray cooling system comprising a cooling surface with a hotspot zone (121) producing a high heat flux; a sprayer in a spaced apart relationship to the hotspot zone and capable of transforming a supply a liquid coolant into a continuous pattern of droplets that impinge and create a thin coolant film generally within the hotspot zone (121); a vapor management protrusion (103) surrounding the sprayer; a secondary incremental drop ejector for adding the fluid to a non-hotspot regions (123,125). Regarding the limitation of how much heat flux is generated, applicant discloses that a chip is capable of generating more than 300 Watts/cm² in one region and under 100 watts/cm in other regions. Since Patel's electronic device is also a chip, it should be capable of generating a similar heat flux. Furthermore, an electronic device such as a die is capable of producing a heat flux of greater than 300 Watts/cm² in its hottest region and under 100Watts/cm² in other cache regions when the other region is not active. (See Chrysler 6,650,542, column 3, line 38-40 as

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evidence). Regarding the limitation of a hydraulic jump and a thin cooling film at the impingement point and a radially thicker film on the cooling surface, this phenomena is an inherently phenomena that is resulted from an impingement cooling including a sprayer in a spaced distance spraying a jet on a cooling surface. This inherently phenomena can be seen from having water running down on the sink from the faucet. The hydraulic jump and the phenomena of impingement cooling on a chip are also described in IBM Technical Disclosure Bulletin (figure 1). In view of the above inherently phenomena, Patel's cooling system is considered to read on the claimed invention since as the sprayer (105) sprays on the hottest region (121). Consequently, a thinner film will be formed at the point of impingement, and a thicker film is radially formed on the non-hot spot regions (123,125). Regarding the limitation of "capable of transforming a... within said hotspot zone", it has been held that recitation that an element is "capable of" performing a function is not positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. In re Hutchison, 69 USPQ 138. In this case the sprayer of Patel is controllable by a control system, it is capable to control the sprayer into a constant flow rate if the heat source temperature does not vary.

Claims 12,20 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel in view of Burward- Hoy (US 6,029,742). Patel discloses substantially all of applicant's claimed invention as discussed above except for the limitation that the hotspot zone includes an array of etched microchannels. Burward discloses (figure 8) an impinging cooling system that has a hotspot zone (282) further includes an array of microchannels for a purpose of increasing the efficiency of heat transfer from the hotspot zone and the fluid. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Burwar-Hoy's

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teaching in Patel's device for a purpose of increasing the efficiency of heat transfer from the hotspot zone and the fluid.

Claims 13,21 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel in view of Kieda et al. (US 5,021,924). Patel substantially discloses all of applicant's claimed invention as discussed above except for the limitation that the sprayer is at a non-perpendicular angle to the cooling surface. Kieda discloses (figure 6) a chip cooling system that has the sprayer (4) angled from the cooling surface for a purpose reducing the pressure that the fluid exerting on the chip. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Kieda's teaching in Patel's device for a purpose of reducing the pressure that the fluid exerting on the chip.

Claims 14,22 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel in view of Kobrinetz (US 5,768,103). Patel discloses substantially all of applicant's claimed invention as discussed above except for the limitation that the sprayer is an atomizer type sprayer. Kobrinetz discloses (figure 3, column 3, lines 44-52 and column 4, lines 16-23) a chip impingement chip cooling system that has the sprayer (60) is atomizer type sprayer for a purpose of atomizing the fluid for a purpose of enhancing the evaporation of the fluid upon impingement. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Kobrinetz's teaching in Patel's device for a purpose of enhancing the evaporation of the fluid upon impingement.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

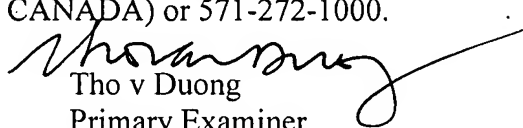
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tho v. Duong whose telephone number is 571-272-4793. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tyler J. Cheryl can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Tho v Duong
Primary Examiner
Art Unit 3744


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October 25, 2007